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WOODS HOLE, MASSACHUSETTS

WOODS HOLE OCEANOGRAPHIC INSTITUTION

Woods Hole, Massachusetts

Reference No. 50-5

PACIFIC OCEANIC BIOLOGY
(Oceanographic Research)

C. J. Fish, SUPERVISOR

October 1, 1949 - December 31, 1949

Periodic Status Report
Office of Naval Research
Contract N6-ori-195/TO 1/NR-083-003

January 1950

APPROVED FOR DISTRIBUTION C. O'D. Iselin
Director

ABSTRACT

Summer sonic fish recordings are being studied from both biological and physical viewpoints. In addition the biological analyses include dissection of specimens used in the experiments for correlation of individual sound variations with size, sex, gonad maturation, etc. A weather-ship plankton program has been substituted for the fouling investigation originally designated for the project. The training program in biological oceanography is proceeding according to plan, with an enrollment of eight graduate student assistants.

Subj: The Oceanic Biology Project

RESEARCH

1. Sonic fish program. Summer field experiments were terminated on 16 September and the records transferred to winter laboratories for study. Biological analyses, to determine the nature of the reactions and the noises produced by various species of fish when subjected to different types of controlled stimulation, are being made by Marie P. Fish.

Anatomical studies of the actual specimens used in the summer experiments are in progress to correlate, if possible, observed individual variations in sound with sex, degree of development of gonads, or other conditions revealed by dissection. Pitch as well as intensity of sound were shown in the present investigation to be dependent on the size of the noisemaker, especially with those species in which an air bladder functions as a resonator. With better equipment now available, additional data will be sought on the sound range possible for each species, and on the relationship of size to tonal qualities.

2. Physical analyses are being conducted under the supervision of Mrs. Fish by Mr. Alton S. Kelsey, Jr. at Brown University. The physical data are being studied from three viewpoints: 1) frequency pattern, 2) diurnal variation, and 3) attenuation effects, with emphasis on the first problem. In the frequency analyses, oscillograms of the individual noises are obtained with a G. E. Recording Oscillograph (type PM-10-A1) used in conjunction with a Harmonic Wave Analyzer. With the accompanying intensity records, the intensity and frequency characteristics of specific noises can be accurately determined. Diurnal variation in the sonic activity of each species is being ascertained by analysis of the daily intensity records. The effect of sound attenuation with distance can be partially determined by comparison of the oscillograms of the sounds at different distances; the effect on intensity is immediately obtainable from Esterline-Angus Graphic Ammeter records.

3. Weathership plankton program. On 15 December representatives of the Navy, Coast Guard and Woods Hole

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Oceanographic Institution approved a weathership plankton program and instructed Charles J. Fish to proceed with the plans as outlined. As amended, this program will replace the fouling investigation in the current Oceanic Biology Project. Arrangements for the institution of observations as soon as the necessary equipment can be assembled were completed at the Eastern Area Headquarters of the Coast Guard on 29 December.

4. As outlined, studies will begin at Station Baker (56°30'N, 51°00'W) in Arctic waters and Station Easy (35°00'N, 48°00'W) in the central North Atlantic. Accurate information on the biology of plankton populations are available only from a few eastern and western Atlantic coastal areas. Weatherships thus afford the first opportunity for comparable year-round investigation at fixed points in the open ocean beyond the immediate influence of the coasts.

5. The research during the first year will have as its objectives a determination of:

a) seasonal variations in size and composition of the zooplankton population of the surface zone in two different faunal regions of the North Atlantic Ocean.

b) the annual cycle of changes in the relative abundance of adults and developmental stages of component species. The observations have been designed to reveal augmentation periods, development rates, depletion rates and frequency of replacement (number of generations) during the production season or seasons.

An attempt will be made to correlate zooplankton productivity with physical environmental factors and later with food when arrangements for comparable phytoplankton analyses can be made. To this end phytoplankton collections will be taken, and held for future study.

6. The field observations and collections will be made by designated Coast Guard officers after a period of indoctrination in methods at the Woods Hole Oceanographic Institution or the Narragansett Marine Laboratory. These

will consist of weekly phytoplankton samples taken at specified depths between 150 meters and the surface with Nansen water samplers (as proposed by Gordon A. Riley), and quantitative zooplankton samples taken in oblique hauls from 150 meters with Clarke-Bumpus samplers (No. 2 and No. 12 silk nets). A qualitative plankton sample will be obtained weekly at night with a standard half-meter net of No. 2 bolting silk. It is expected that field work will commence in February.

TRAINING

7. The training program is proceeding as described in the previous Periodic Status Report. In September eight carefully screened student assistants enrolled in the graduate curriculum in biological oceanography. Seven are candidates for the degree of Master of Science in Marine Biology at Rhode Island State College, and one, having completed requirements for the Master's degree is a candidate for a doctorate degree at Brown University. A limit of seven graduate student assistants had originally been established, but the number was subsequently increased to eight to accomodate a highly recommended and experienced member of the Hydrographic Office Division of Oceanography whose application was received after the first seven appointments had been made. All are making creditable records and should be prepared for participation in the plankton program when field work starts.

8. Representatives of the Woods Hole Oceanographic Institution and U. S. Fish and Wildlife Service, who are supplementing the resident faculty in the training program in Kingston this semester, are listed in the appended schedule (Enclosure A).

9. On 9 November 1949 an Advisory Graduate Curriculum Committee in Biological Oceanography, consisting of the following members, was appointed by the Board of Regents of Rhode Island State College on the recommendation of the project supervisor:

Columbus O'D. Iselin, The Woods Hole Oceanographic Institution and Harvard University
Alfred C. Redfield, The Woods Hole Oceanographic Institution and Harvard University

George L. Clarke, Harvard University and the Woods Hole Oceanographic Institution
Lionel A. Walford, U. S. Fish and Wildlife Service

PERSONNEL

IO.	Name	Title	Total Man Days*
	Charles J. Fish	Senior Biologist, in charge (quarter time)	15.5
	Marie P. Fish	Assistant Biologist	62
	Mary C. Cobb	Secretary-Technician	62
	Alton S. Kelsey, Jr.	Student-assistant	26
			165.5 Man Days

*Man day consists of 8 working hours.

Calendar of Lectures

Sept. 19	INTRODUCTION.	Dr. Columbus O'D. Iselin, Director, Woods Hole Oceanographic Institution.
Sept. 26	PHYSICAL OCEANOGRAPHY I.	Mr. Martin J. Pollak, ibid.
Oct. 3	PHYSICAL OCEANOGRAPHY II.	Mr. Martin J. Pollak, ibid.
Oct. 10	SUBMARINE GEOLOGY.	Prof. Clarence E. Miller, Rhode Island State College.
Oct. 17, 18	OCEANIC CHEMISTRY I AND II.	Dr. Alfred C. Redfield, Assoc. Director, Woods Hole Oceanographic Institution.
Oct. 24	MARINE BACTERIOLOGY.	Dr. Bostwick H. Ketchum, ibid.
Oct. 31	PHYTOPLANKTON.	Dr. Gordon A. Riley, The Bingham Oceanographic Foundation, Yale University.
Nov. 7	ZOOPLANKTON I.	Dr. George L. Clarke, Harvard University.
Nov. 14	ZOOPLANKTON II.	Dr. Charles J. Fish, Rhode Island State College.
Nov. 28	BENTHONIC INVERTEBRATES I.	Dr. Donald J. Zinn, Rhode Island State College.
Dec. 5	BENTHONIC INVERTEBRATES II.	Dr. David L. Belding, Boston University.
Dec. 12	FISH I.	Dr. Lionel A. Walford, Chief, Branch of Fishery Biology, U. S. Fish and Wildlife Service.
Jan. 3	FISH II.	Dr. William F. Royce, Director, Woods Hole Federal Fisheries Laboratory.
Jan. 9	MARINE BIOGEOGRAPHY.	Dr. Louis W. Hutchins, Director, Bermuda Biological Station.
Jan. 16	SUMMARIZATION.	Dr. Henry B. Bigelow, President, Woods Hole Oceanographic Institution.

The visiting lecturers assign the laboratory work, supplementary reading, and questions for a short examination in the last laboratory hour each week. Assignments following the lectures are conducted by members of the resident staff.